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Econ@uj Investigational Report

Yellowfish

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Figure: Yellowfish are important indicator species which can tell us a lot about the ecological state or health of rivers in South Africa.

Have you ever thought of how many fish species from South Africa you would be able to identify? Most of you have probably heard of fishes such as Trout, Carp or Bass but, what is quite sad about so many people knowing of these fishes is that none of these fishes are indigenous. They are all exotic and in many ways considered to be unwelcome. Very few exotic species do not negatively impact our systems, although if these populations can be managed the impact can be limited.

In Southern Africa we have over 300 indigenous species of freshwater fishes. Indigenous species are those which naturally occur in our aquatic systems in South Africa. Today there may be as many as 30 species of fishes in our freshwater aquatic ecosystems which did not naturally occur in Southern Africa and these species are referred to as exotic species.

So what about our indigenous species of fishes? Have you ever heard of the Common Sharptooth Catfish, widely known as a Barber? The miraculous fish that can “walk” over land when it needs to find suitable new habitat, especially if the river it is in, is drying up. How about some of our Cichlid species, including the Banded Tilapia (Vliekurper), or the Mozambique Tilapia (Bloukurper)? Surely you must have heard about our ferocious Tigerfish? Now how about our Yellowfish? I’m hoping that you have heard of at least our Yellowfish, and if you have, have you considered this:

- Do you know that there are six species of Yellowfish in South Africa?
- Do you know that some of them can grow as big as 22 kilograms?
- Do you know that many people spend a lot of money every year to angle specifically for Yellowfish?
- Do you know that in South Africa we use Yellowfish as representative species to conserve large parts of aquatic ecosystems?
- Do you know that Yellowfish are often used in South Africa to establish management plans for the use of aquatic ecosystems, specifically in terms of the volume of water which can be used?
- And, do you know that Yellowfish can tell us a lot about how healthy an aquatic ecosystem is?

In this article I'm going to give you an overview of the Yellowfish species which occur in South Africa, how widely distributed these species are, some interesting things about Yellowfish biology that you might not know about and how we can use Yellowfish in South Africa to facilitate the management of aquatic ecosystems.

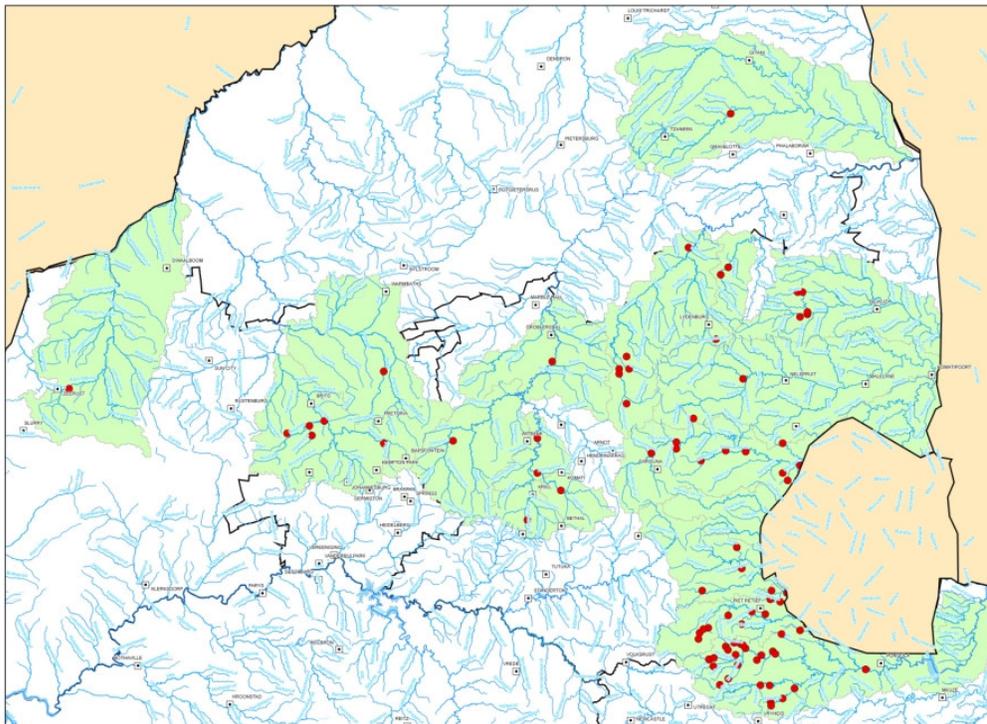


Figure: Distribution of Yellowfish in South Africa (new pic coming)



Figure: Yellowfish on fly. One of the most exciting freshwater fish which can be caught on fly.

Most people may call them all Yellowfishes but now let me introduce you to how we refer to this special group of fishes. Scientists always refer to the Latin what we call scientific names of fishes and Yellowfish all belong to the Genus *Labeobarbus*. So If we now consider the species which occur in South Africa they include: *Labeobarbus kimberleyensis* (Vaal-Orange Largemouth Yellowfish), *L. aeneus* (Vaal-Orange Smallmouth Yellowfish), *L. polylepis* (Bushveld Smallscale Yellowfish), *L. marequensis* (Lowveld Largescale Yellowfish), *L. natalensis* (KwaZulu-Natal Yellowfish), and *L. capensis* (Clanwilliam Yellowfish). In addition to these species one other occurs in Southern Africa and is *L. codringtonii* the Upper Zambezi Yellowfish.

These Yellowfish can be grouped into two large dissimilar groups, including the broader large-scale and small-scale group of species. The small-scale group dominates Southern Africa and as a result the majority of species which occur here belong to this group. Of the species which occur in Southern Africa excluding the Lowveld Largescale and the Upper Zambezi Yellowfishes the remaining five species belong to the small-scale group. Species from these broad groups are quite different and easily distinguished from one another, but within each group individual species can be difficult to separate. What we use is a combination of; the number of lateral line scales, the size of the fishes head and month in proportion to its body size and the relative position of the pelvic and dorsal fin, for example.

Within the small-scale group individuals readily interbreed, especially if facilitated by human intervention. Why then may you ask have these species separated to the extent that there are five species which occur here, which can readily interbreed, but have not? Well the answer is simple, they have all been geographically separated or they have been isolated from each other by occurring in different river systems. In some cases where a large geographical barrier such as a waterfall separates two populations of an individual species the population above the barrier can develop into a genetically different species over a long period of time. Yellowfish have a remarkable ability to adapt to their environments and when some species are forced to adapt to specific ecosystems which are unique, after a period of time they begin too become unique. This is specifically the case of a population of Bushveld Smallscale Yellowfish (*L. polylepis*) in the Elands River (Mpumalanga). This population has been isolated by a 40m waterfall, and has been identified to be genetically unique and have a specific biology which differs from similar populations, even the population downstream of the waterfall.



Figure: Sampling of Yellowfish in the Assegai River, Mpumalanga. In one seine net haul over 160 individuals were collected.

In another case two species occur together (the Orange-Vaal Largemouth and Smallmouth Yellowfishes – *L. kimberleyensis* and *L. aeneus*) in the Orange-Vaal River system. It has widely been believed that these species are genetically different and as a result do not interbreed. But, what we've just discovered is that they have been interbreeding due to what scientists broadly believe to be mans interference with this aquatic ecosystem. These two species probably remained different due to very specific, different ecological cues or ecosystem conditions. These cues have caused them to carry out different biological actions such as breeding and migration activities. In the case of these two species, they have ecological cues in the form of water temperature and to a lesser degree the day length and an increase in flow in the system. So after

winter, for example, when the water temperatures increase to about 17°C all Smallmouth Yellowfish begin to move into suitable breeding areas or spawning areas which just happen to be the same spawning areas for the Largemouth Yellowfish. Largemouth Yellowfish begin to move into breeding areas when water temperatures increase to about 19 or 20°C. By this time all of the Smallmouth Yellowfish should have completed their breeding and the spawning areas would now be available for the Largemouth Yellowfish. This would be the case under natural conditions but these days we don't allow natural flow regimes to occur in the Orange-Vaal River system. Over the last 10 to 20 years or so, the environmental cues may have either not been available in combination as is required (right flows, day length and water temperature) or the conditions required by both species have been made available at the same time, which causes the two species to spawn together. We don't have enough information to say exactly what is happening to these species but in any case, we think that this type of problem has caused a lot of inbreeding, which is making it very difficult for us to find any "pure" populations. As a result, Largemouth Yellowfish are in a bit of trouble as they are more susceptible to changes in environmental conditions and hybridization with Smallmouth Yellowfish. This species is now considered to be in danger of extinction and has been awarded with threatened status on the International Union for the Conservation of Nature (IUCN) species listing system.



Figure: Golden, Clanwilliam Yellowfish from the Rondegat River, Cape Floral Kingdom. Our rivers do run wild with gold.

This brings us onto two important components of Yellowfish biology. They are sensitive to ecosystem conditions which we can use to manage ecosystems, and Yellowfish are important components of our biodiversity in that they occupy very important ecological niches (components or functions in an ecosystem).

Firstly, Yellowfish are good indicators of ecosystem state. This relates to the understanding of their biology, of which, we have spent some time researching to clearly characterize. Yellowfish need specific environmental components (including physical habitat types, clean water quality, flow regimes, and substrate types through out different times of their life cycle) food sources (they can be herbivorous during certain parts of their life cycles and then carnivorous during others) and even sometimes large reaches of river systems for migration purposes. Because we know so much about what these fishes need to be successful, we know that river systems need to have certain types of environmental components at certain states of health. They need a range of food types and need to be free of barriers over large segments of river. Knowing this, if we provide these specific conditions then the Yellowfish populations remain stable and there is good recruitment of new offspring (they breed and grow successfully). If this is the case and in some systems we find good healthy populations, we can assume that these ecosystem requirements are being provided, and as a result, we know the general overall state the entire ecosystem. Taking this understanding a step further we can make water users, or activities who are impacting on these systems, maintain the ecosystem state to ensure Yellowfish population stability and as a result protect the rest of the ecosystem.



Figure: Bushveld Smallscale Yellowfish from the Elands River in rare breeding condition. Males sometimes develop turbecules, predominantly on their heads during breeding periods.

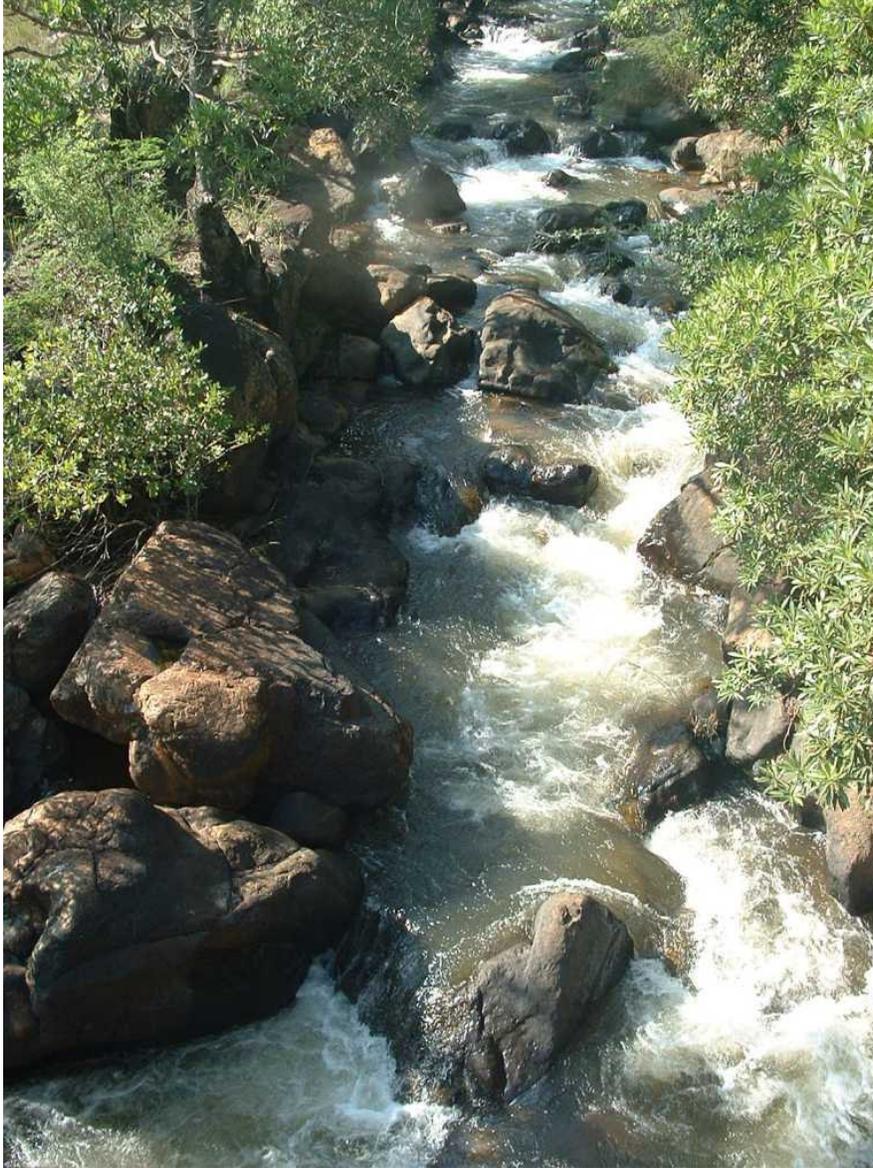


Figure: Houtbosloop River, a tributary of the Crocodile River in Mpumalanga. For decades Yellowfish have been migrating up and down these rapids in large numbers. This scene provides an awesome display of the wonder of nature, seldom seen in South Africa.

Why do you think that we should look after Yellowfish above other species? Or why do you think that we spend so much time focusing on Yellowfish and not on other species such as extremely sensitive fish or aquatic invertebrates? Well, Yellowfish have been

identified as aquatic organisms which have vast ecological, social and economic value. They are ecologically important as indicated in terms of the biodiversity of our country, and Yellowfish occupy positions in ecosystems which are important to keep the ecosystem in equilibrium. They occupy ecologically important niches and as a result are ecologically important to the whole ecosystem. They are socially important in that many people in South Africa know of these fishes, and often many have grown up on the banks of rivers trying to catch one. I can also illustrate this point by referring to this article. I'm using Yellowfish to show you a few things about the management and ecology of aquatic ecosystems. Finally ,Yellowfish are also ecologically important in that they bring in allot of revenue to angling outfitters and fulltime fly-fishing guides who focus on offering clients with a unique "African experience" by catching one of the worlds best fighting freshwater fish on fly. Based on these reasons we can argue that Yellowfish are good candidates to use as indicator and even flagship species in conserving, managing and the focusing the sustainable use of aquatic ecosystems.

This approach has been widely used in South Africa in specific conservation, management and or Yellowfish utilization endeavors which are aimed at protecting these aquatic ecosystems. Two examples include the Elands River Yellowfish Conservation Area in Mpumalanga and the Orange-Vaal River Yellowfish Conservation and Management Association. These endeavors are focused on promoting the sustainable use of Yellowfish populations in the form of "eco-friendly" catch and release fly-fishing activities which target Yellowfish. These endeavors use Yellowfish to get clients to come into the areas of these endeavors and pay for accommodation and guiding fees to angle for Yellowfish, to educate schools and local stakeholders on the importance of managing and protecting aquatic ecosystems and most importantly to monitor the state of aquatic ecosystems.

If you're interested in more information on Yellowfish or how you can get involved in these conservations endeavors or even how you can make a career out of aquatic ecology then contact us.



Figure: Fly-fishing for Yellowfish in the Vaal River, this 4kg specimen proved to be a phenomenal challenge which is back in the river.